Claims

What is claimed is:

1. An optical integrated circuit, comprising:

at least one waveguide extending axially between first and second ends, each waveguide having a centerpoint centrally located between the first and second ends; and

a waveplate intersecting the at least one waveguide at an intersection spaced from the centerpoint.

2. The optical integrated circuit of claim 1, wherein the waveplate intersects the at least one waveguide at an angle of about 70 degrees or more and less than 90 degrees with respect to the axis of the at least one waveguide.

3. The optical integrated circuit of claim 1, wherein the intersection is spaced from the centerpoint of the at least one waveguide by a first distance.

4. The optical integrated circuit of claim 3, comprising a second waveguide extending axially between first and second ends and having a centerpoint centrally located on the second waveguide between the first and second ends;

wherein the waveplate intersects the second waveguide at an intersection spaced from the centerpoint of the second waveguide by a second distance, and wherein the first distance and the second distance are approximately equal.

5. The optical integrated circuit of claim 4, wherein the at least one waveguide comprises a first portion between the first end and the centerpoint and a second portion between the second end and the centerpoint, wherein the second waveguide comprises a first portion

between the first end and the centerpoint and a second portion between the second end and the centerpoint, and wherein the waveplate intersects the first portions of the waveguides.

6. The optical integrated circuit of claim 5, comprising an input lens providing light to the first ends of the waveguides and an output lens receiving light from the second ends of the waveguides.

7. The optical integrated circuit of claim 4, wherein the waveplate intersects the at least one waveguide at an angle of about 70 degrees or more and less than 90 degrees with respect to the axis of the at least one waveguide, and wherein the waveplate intersects the second waveguide at an angle of about 70 degrees or more and less than 90 degrees with respect to the axis of the second waveguide.

8. The optical integrated circuit of claim 7, wherein the centerpoints of the waveguides are located on a first line, wherein the intersections of the waveplate with the waveguides are located on a second line, and wherein the first and second lines are generally parallel.

9. The optical integrated circuit of claim 8, wherein the at least one waveguide comprises a first portion between the first end and the centerpoint and a second portion between the second end and the centerpoint, wherein the second waveguide comprises a first portion between the first end and the centerpoint and a second portion between the second end and the centerpoint, and wherein the waveplate intersects the first portions of the waveguides.

10. The optical integrated circuit of claim 9, wherein the intersections of the waveguides are located on curvilinear portions of the waveguides.

11. The optical integrated circuit of claim 4, wherein the centerpoints of the waveguides are located on a first line, wherein the intersections of the waveplate with the waveguides are located on a second line, and wherein the first and second lines are generally parallel.

12. The optical integrated circuit of claim 4, wherein the waveplate intersects the at least one waveguide at an angle of about 80 degrees or more and about 85 degrees or less with respect to the axis of the at least one waveguide, and wherein the waveplate intersects the second waveguide at an angle of about 80 degrees or more and about 85 degrees or less with respect to the axis of the second waveguide.

13. The optical integrated circuit of claim 4, wherein the intersections of the waveguides are located on curvilinear portions of the waveguides.

14. The optical integrated circuit of claim 1, comprising an arrayed-waveguide grating planar lightwave circuit.

15. The optical integrated circuit of claim 1, wherein the waveplate comprises a half-wave plate.

16. An arrayed-waveguide grating device, comprising:

a base with a plurality of optical paths extending through the base between first and second optical components, the optical paths individually having midpoints centrally located between the first and second optical circuits, the midpoints of the optical paths located along a line;

a waveplate spaced apart from and generally parallel to the line and intersecting the plurality of optical paths, the waveplate operative to reduce polarization dependence of the arrayed-waveguide grating device.

17. The arrayed-waveguide grating device of claim 16, wherein the waveplate intersects the optical paths at intersections at an angle with respect to the optical paths, wherein the angle is about 70 degrees or more and les than 90 degrees to reduce back reflection in the arrayed-waveguide grating device.

18. The arrayed-waveguide grating device of claim 16, wherein the waveplate intersects the optical paths at intersections spaced from the midpoints of the optical paths, and wherein the intersections in each of the optical paths are generally equally spaced from the corresponding midpoints.

19. The arrayed-waveguide grating device of claim 16, wherein the waveplate comprises a half-wave plate.

20. A method of manufacturing an optical integrated circuit, comprising:

providing a base having at least one waveguide extending axially between first and second ends with a centerpoint centrally located between the first and second ends; and

providing a waveplate in the base intersecting the at least one waveguide at an intersection spaced from the centerpoint of the at least one waveguide.

21. The method of claim 20, wherein providing the waveplate comprises locating the waveplate so as to intersect the at least one waveguide at an angle of about 70 degrees or more and less than 90 degrees with respect to the axis of the at least one waveguide.

22. The method of claim 21, further comprising providing a second waveguide in the base extending axially between first and second ends and having a centerpoint centrally located between the first and second ends of the second waveguide, wherein providing the waveplate comprises locating the waveplate so as to intersect the at least one waveguide at an angle of about 70 degrees or more and less than 90 degrees with respect to the axis of the at least one waveguide and to intersect the at second waveguide at an angle of about 70 degrees or more and less than 90 degrees with respect to the axis of the second waveguide.